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ABSTRACT

This booklet contains a brief introduction to the use of the metric system. Topics covered include: (1) what is the metric system; (2) how to think metric; (3) some advantages of the metric system; (4) basics of the metric system; (5) how to measure length, area, volume, mass and temperature the metric way; (6) some simple calculations using metric units; and (7) a metric system test. (MP)

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METRIC SYSTEM

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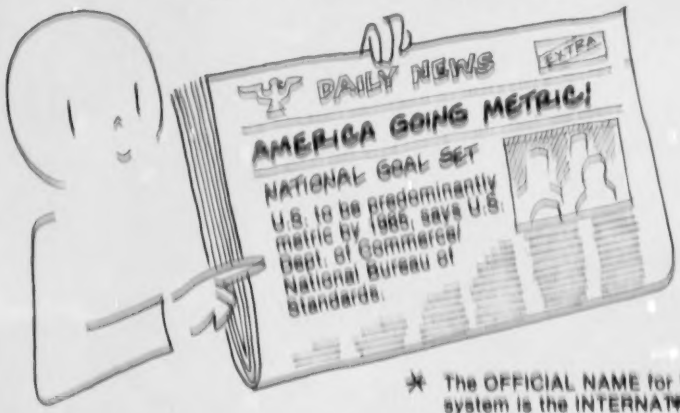
. . . it's an INTERNATIONAL LANGUAGE OF MEASUREMENT (a way of saying "how long," "how heavy," "how fast," etc.)

The U.S. is one of the few nations in the world that DOESN'T YET use the metric system for all measurements

. . . BUT THAT'S CHANGING!


DAILY NEWS
EXTRA
AMERICA GOING METRIC!
NATIONAL GOAL SET
U.S. to be predominantly metric by 1985, says U.S. Dept. of Commerce/ National Bureau of Standards.

* The OFFICIAL NAME for the metric system is the INTERNATIONAL SYSTEM of UNITS (abbreviated SI).

A SCRIPTOGRAPHIC BOOKLET by CHANNING L. BETE CO., INC., Greenfield, Mass. U.S.A.
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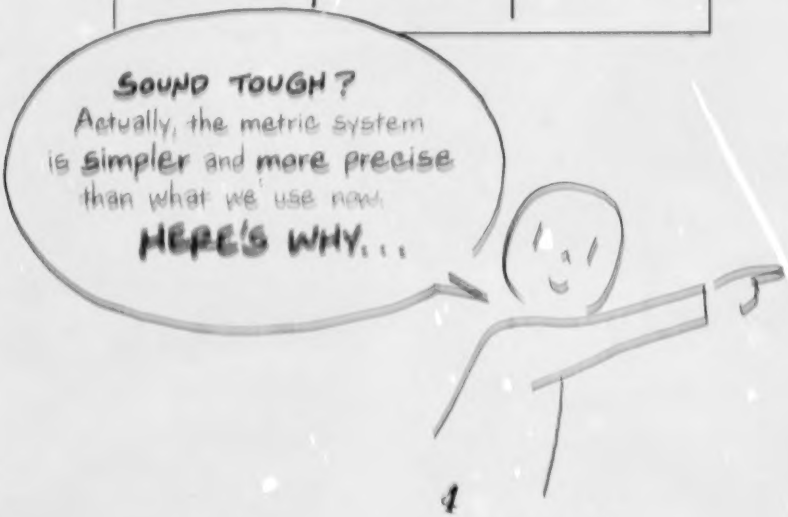
NOW is the time to learn how to **THINK METRIC!**

Start thinking of everything in metric terms — don't just "translate" to metric from our present system.

For example, THINK OF--	LITRES of gasoline	HECTARES of land
Temperature in CELSIUS	Your weight in KILOGRAMS	Your height in CENTIMETRES

SOUND TOUGH? Actually, the metric system is **simpler** and **more precise** than what we use now. **HERE'S WHY...**



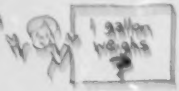
Some ADVANTAGES o THE METRIC

IT'S EASY TO USE

CUSTOMARY SYSTEM

- MANY CONFUSING UNITS

- Measurements NOT logically related



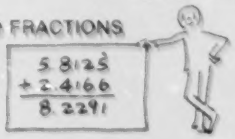
- FRACTIONS ("proper" and "improper")

METRIC SYSTEM

- FEWER, SIMPLER UNITS

- ALL MEASUREMENTS logically related

- NO FRACTIONS



IT MAKES SENSE FOR AMERICA

We need **ONE UNIFORM SYSTEM** for all measurements.

Today, many American businesses and industries already rely on the metric system (for example, pharmacists and photographers).

One system for everyone :: with no costly, inefficient duplication :: makes sense.

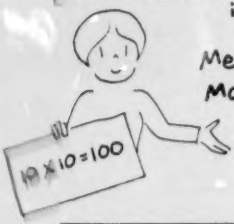
We need the metric system for a **HEALTHY ECONOMY.**

81% of the world's nations are using the metric system. Changing over will help sell U.S. products abroad :: boosting our balance of trade.

SYSTEM

IT'S EASY TO LEARN

☑ "TIMES (X) 10" is the only MATH you need in the metric system.



Metrics work just like our MONEY SYSTEM WORKS--

100 pennies = 10 dimes = 1 dollar

☑ PREFIXES let you MULTIPLY and DIVIDE by 10 automatically.

÷

- "DECI" = 1/10 (0.1)
  10 decilitres = 1 litre
- "CENTI" = 1/100 (0.01)
  100 centimetres = 1 metre
- "MILLI" = 1/1000 (0.001)
  1000 milliseconds = 1 second

×

- "DECA" = 10
  1 decametre = 10 metres
- "HECTO" = 100
  1 hectogram = 100 grams
- "KILO" = 1000
  1 kilolitre = 1000 litres

☑ DECIMAL POINTS make it easy to CHANGE UNITS by--

MOVING LEFT to show LARGER units

- 650.0 grams = 6.50 hectograms
- 23.2 metres = 2.32 decametres
- 2.0 grams = 0.002 kilogram

MOVING RIGHT to show SMALLER units

- 4.20 metres = 4200.0 millimetres
- 12.0 litres = 120.0 decilitres
- 1.0 centimetres = 10.0 millimetres

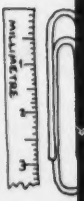
BASICS OF THE

The 7 BASE UNITS of METRIC MEASUREMENT

You need **NOT** know the technical definitions for use in daily life.

❶ LENGTH
metres (m)

One metre is defined as 1 650 763.73 wave lengths in vacuum of the orange-red line of the spectrum of krypton 86. (See p. 8.)



❹ TEMPERATURE
degrees Celsius (°C)

Temperature is measured on the Celsius scale: water freezes at 0°C and boils at 100°C. (See p. 12.)

❺ ELECTRIC CURRENT
amperes (A)

One ampere is defined as the magnitude of electric current needed to produce a given force between 2 wires.

These 7 base units ar

SPEED

is measured in METRES PER UNIT OF TIME (a car's speed is measured in kilometres per hour).

AREA

is measured in SQUARE METRES, SQUARE CENTIMETRES, etc. Land area is measured in hectares -- 10 000 m². (See p. 9.)

METRIC SYSTEM

② TIME
seconds (s)

One second is defined as 9 192 631 770 cycles of the radiation associated with a specified transition of the cessium-133 atom.

③ MASS
grams (g)

One gram is measured using a standard for the gram -- a cylinder of platinum-iridium alloy -- kept by the International Bureau of Weights and Measures. (See p. 11.)

⑥ LUMINOUS INTENSITY
candelas (c)

One candela is defined as the luminous intensity of 1/600 000 of a square metre of a radiating cavity at a given temperature.

⑦ MATTER
moles (m)

One mole is defined as the amount of a substance in a system that contains as many elementary entities as there are atoms in 0.012 kg of carbon 12.

COMBINED to form all other units.

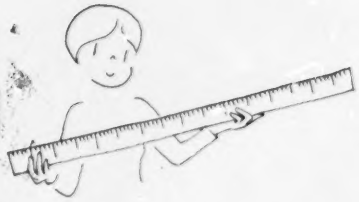
VOLUME

is measured in LITRES, or CUBIC METRES. Millilitres are used for small volumes. (See p. 10.)

PRESSURE

is measured in KILOGRAMS PER CUBIC CENTIMETRE.

How to measure LENGTH the metric way

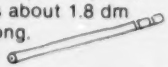


SHORT

MILLIMETRE
Photographers use 35 mm film.

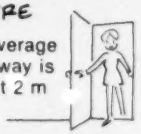
CENTIMETRE
A 25¢ piece is about 2.5 cm in diameter.

DECIMETRE
A standard unsharpened pencil is about 1.8 dm long.

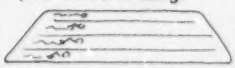


MEDIUM

METRE
An average doorway is about 2 m tall.



An olympic swimming pool is 50 m long.

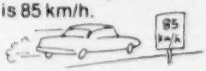


A small car is about 3 m long; a large one is about 4 m.

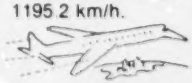
LONG

KILOMETRE
It is 4000 km from New York to San Francisco.

Speed is measured in kilometres per hour (km/h). Our national maximum speed limit is 85 km/h.



The sound barrier is 1195.2 km/h.



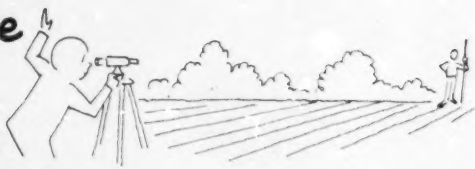
LENGTH					
	millimetre	mm	1 mm	=	0.001 m
	centimetre	cm	1 cm	=	10 mm
	decimetre	dm	1 dm	=	10 cm
	metre	m	1 m	=	100 cm
	kilometre	km	1 km	=	1000 m

For practice, ESTIMATE--

1. The diameter of a pencil, in mm.
2. The dimensions of this booklet, in cm.
3. The dimensions of the room you're in, in m.
4. The distance to a friend's house, in km.

ANSWERS: ❶ Typically, 8 mm ❸ 15 cm x 20.2 cm

How to measure AREA the metric way



SMALL

SQUARE CENTIMETRE

Each square on a checkerboard is about 17.5 cm^2.

SQUARE METRE

The side of a small house measures about 30 m^2 (10 m x 3 m).

MEDIUM

HECTARE

A suburban building lot may measure about 0.125 ha.

A typical golf course contains about 40 ha.

LARGE

SQUARE KILOMETRE

The nation's largest state is 906 290 km^2.

The area of the smallest state is 1679 km^2.

AREA

square centimetre	cm^2	1 cm^2 = 100 mm^2
square decimetre	dm^2	1 dm^2 = 100 cm^2
square metre	m^2	1 m^2 = 100 dm^2
hectare	ha	1 ha = 100 a
square kilometre	km^2	1 km^2 = 100 ha

For practice, ESTIMATE--

1. The area of a postage stamp, in cm^2.
2. The area of one newspaper page, in dm^2.
3. The area of a wall in the room you're in, in m^2.
4. The area of a nearby park or field, in ha.

ANSWERS: 1. 136 stamp - 5.5 cm^2 2. About 22 dm^2

10

How to measure
VOLUME
the metric way

SMALL

MILLILITRE
(cubic centimetre)

Doctors and pharmacists already measure drugs in metrics.

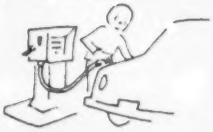
A small spoon holds about 5 ml.

MEDIUM

LITRE
(cubic decimetre)

Milk, juice, etc., will be sold by the litre.

If your car gets good "mileage," you should get about 13 km/l.



LARGE

CUBIC METRE

This 10-wheeler can haul 10 m³ of material.

A 50 m x 30 m x 10 m swimming pool holds 15 000 m³ of water.

VOLUME				
	cubic centimetre	cm^3	1 cm^3	= 0.001 l
	millilitre	ml	1 ml	
	cubic decimetre	dm^3	1 dm^3	= 1000 ml
	litre	l	1 l.	
	cubic metre	m^3	1 m^3	= 1000 l

For practice, ESTIMATE--

1. The capacity of a coffee cup, in ml.
2. The capacity of a bath tub, in l.
3. Your car's "mileage," in km/l.
4. The volume of the room you're in, in m^3.

ANSWERS: 1 Typically, 250 ml 2 Typically, 160 l

How to measure MASS the metric way

LIGHT

MILLIGRAM

A postage stamp weighs about 10 mg.

GRAM

A penny weighs about 3 g.

A can of coffee weighs about 450 g.

MEDIUM

KILOGRAM

You may buy a 5 kg sack of potatoes.

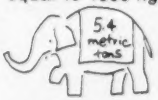
You may weigh in at 70 kg.

A studio piano weighs about 250 kg.

HEAVY

METRIC TON

Heavy weights are measured in the metric ton (t) -- equal to 1000 kg.



The Queen Mary II weighs about 82 500 t.

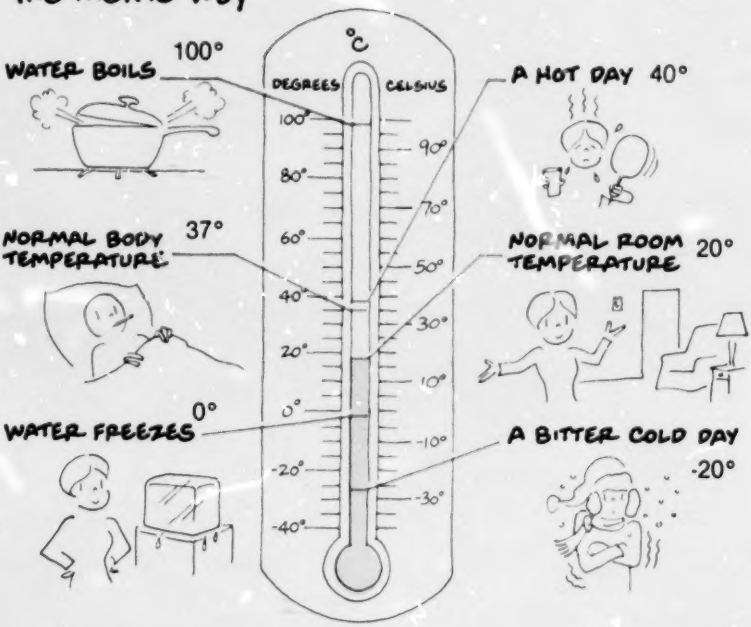
MASS					
	milligram	mg	1 mg	=	0.001 g
	gram	g	1 g	=	1000 mg
	kilogram	kg	1 kg	=	1000 g
	metric ton	t	1 t	=	1000 kg

For practice, ESTIMATE--

1. The weight of a wristwatch, in g.
2. The weight of a typewriter, in kg.
3. The weight of a friend, in kg.
4. The weight of a car, in t.

ANSWERS: 1 Typically, 50 g 3 About 10 kg

How to measure
TEMPERATURE
the metric way

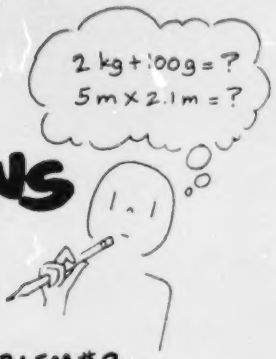


NOTE: The prefixes shown on p. 5 are NOT USED with temperature measurements as they are with mass, volume, length, etc.

For practice, ESTIMATE--

1. The temperature of ice cream.
2. The temperature of an oven for baking a cake.
3. The temperature outside today.
4. The temperature of the room you're in.

ANSWERS: 1. 2°C 2. 250°C



Try some simple CALCULATIONS

using metric units

(before checking answers)

PROBLEM #1

If hamburg costs $2.00/kg and you buy $6.50 worth for a cookout, how many hamburgers will you be able to make if each hamburger weighs 100 grams?

$6.50 ÷ $2/kg = 3.25 kg
3.25 kg = 3250 g
3250 ÷ 100 = 32.5
You will be able to make
32½ hamburgers

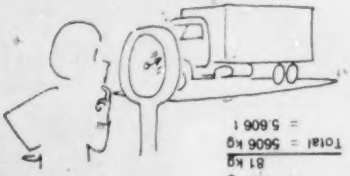
PROBLEM #2

A train leaves Greenville for Brownville. It travels 25 km at 50 km/h. After a 15 minute stop, it covers the remaining 15 km in 15 min. What is its average speed in km/h for the trip?

25 km @ 50 km/h = ½ hr.
½ hr. + 15 min. + 15 min. = 1 hr.
25 km + 15 km = 40 km
Average speed = 40 km/h.

PROBLEM #3

What is the total weight of a truck and its load if the truck weighs 4.32 tons, the load weighs 1.10 tons, and there are 2 people in the cab, one weighing 105 kg, and the other weighing 81 kg?



4.32 t = 4320 kg
1.10 t = 1100 kg
105 kg
+ 81 kg
Total = 5606 kg
= 5.606 t

Try this recipe for "METRIC" CHEESE BISCUITS

Ingredients:
250 g self-rising flour
30 g butter or margarine
60 g grated cheese
1.25 ml salt
pinch of pepper
160 ml milk

Mix all ingredients. Roll out 1.5 cm thick on floured board. Cut into circles. Bake at 230°C for 10-12 mins.

Try this metric system "TEST"

(Refer to previous pages when necessary.)

❶ How many 250 millilitre cups can you fill with 5 litres of water?

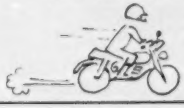
❷ If coffee costs .9¢ per gram, how much do 250 grams cost? 1kg?

❸ A race track is 1500 metres long. What is its length in kilometres? . . . in centimetres?

❹ What's the area of a roadway 4 metres wide and 10.4 kilometres long, in m² and in hectares?

❺ If a truck can hold ½ ton, how many loads will it take to move 10,000 bricks weighing 2 kg each?

❻ At a constant speed of 120 km/h, how long would it take a motorcycle to go 100 m? 10 000 m?



❼ How many litres of water can you pour into 25 100 millilitre containers?

❽ How much carpeting will it take to cover a floor 5.59 m long by 3.81 m wide?

❾ What is the volume of a box that measures 1.35 m x 42 cm x 600 mm?

ANSWERS

① 20 cups
② 250 g - $2.25/1 kg - $9.00
③ 1.5 km/150 000 cm
④ 41 600 m²/4.16 ha
⑤ 40 trips
⑥ 100 m in 3 sec/10 000 m in 5 min.
⑦ 2.5 litres
⑧ 21.2979 m²
⑨ .3402 m³

SOO--

YOU can help make the metric system
PART OF AMERICA'S LIFE--

- **KNOW** the metric units and prefixes and the sizes they represent.
- **GET** metric tools -- ruler, tape measure, scales, cooking utensils, etc.
- **LEARN** familiar measurements in metric units -- your weight, height, distance to work, school, etc.
- **USE** the metric system whenever possible in your daily life.

--MAKE THE METRIC SYSTEM PART OF YOUR LIFE!